
TELECOMMUNICATIONS

This section addresses the efforts being undertaken by the telecommunications industry and current expectations for reliability.

BACKGROUND AND VULNERABILITIES

Telecommunications services are critical to every sector of the economy, including key infrastructure operations that are essential to the safety and well-being of citizens, such as power, banking, and government operations. With less than a hundred days to go before the Year 2000, the global telecommunications industry is locked in a race to prevent Y2K-related problems in software and hardware.

Y2K raises the prospect of serious repercussions for the global information infrastructure (GII) and the National Information Infrastructure (NII). The industry powering these infrastructures is determined to remediate problems and develop contingency plans. However, the GII and the NII are complex organic entities whose stability could be compromised by more than technical problems. Waves of public panic, a lack of preparedness, or malicious activities could all erode the assurance of key systems.

During the past year, the U.S. telecommunications industry came together in an unprecedented fashion to exchange technical information and collaborate on the massive challenge lurking in and between their respective networks. The Committee has closely monitored the activities of this sector, with a focus on network stability (domestically and internationally), 911 readiness, and contingency planning. (This report discusses 911 readiness under the Emergency Preparedness and Emergency Services Subsector.)

WHAT IS BEING DONE?

The NII is powered by five industry sectors: wireline telephone, wireless telephone, satellite, cable television, broadcast television, and radio. Wireline communications continue to be among the most important technologies to U.S. commerce, national security, and emergency preparedness. On the domestic front, there is high confidence in the reliability and Y2K readiness of the U.S. telecommunications infrastructure. This confidence stems from in-depth interoperability tests conducted by carriers (wireline/wireless) and manufacturers. The industry is using a complementary tiered approach to Y2K interoperability testing. Three key groups are providing testing:

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***—THE FEDERAL
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COMMISSION***

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- the Telco Year 2000 Forum is testing local exchange carrier (LEC) network services;
- the Alliance for Telecommunications Industry Solutions (ATIS) is testing interoperability between LEC and interexchange carrier networks; and
- the International Telecommunication Union (ITU) is coordinating testing of international gateway switches.

This inter-carrier testing supplements extensive vendor product testing and independent carrier testing. Sprint, for example, has completed a series of Year 2000 voice interoperability telephony tests with its international partners.¹ AT&T collaborated on Y2K testing with Singapore Telecom and the Y2K Financial Networks Readiness Consortium. The test used previously certified Y2K compliant equipment to demonstrate that Y2K would have no impact on key financial transactions exchanged between the participants.²

Telco Forum

The Telco Forum is a voluntary industry effort focused on understanding Y2K-related concerns for the public switched telephone network (PSTN). The Forum's work was funded by its members--Ameritech, Bell Atlantic, Bell South, Cincinnati Bell, GTE Southern New England Telephone, SBC Communications and U.S. West. The participating companies represented 90% of the access lines in the U.S. The Forum

focused its testing and research energies on ensuring that date dependencies in the PSTN would not compromise information

- exchanged between network elements;
- used to manage traffic on the network;
- utilized during the provisioning of facilities or services; or
- required for proper processing of billing information processed in the exchange of information over the network.³

The Forum sought to build on testing by individual carriers, vendors, and manufacturers. The multi-level approach to testing centered on issues specific to LECs that provide local phone service nationally. By defining four key areas of the LEC networks, the Forum could concentrate testing efforts on emergency services, basic enhanced and intelligent services, management systems and data/transport. From these key areas, the forum tested 54 unique configurations comprising most U.S. PSTN configurations.

According to its final report, the Forum executed 1,914 tests; fewer than 2% of these tests identified any Y2K-related problems. Six Y2K-related anomalies were encountered but none were deemed to affect service. Vendors successfully fixed the anomalies and re-tested solutions. More than 98% of the cases were run without any problems. The tests were run with remediated and

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Y2K ready equipment. As the Forum reported,

*"These results confirm the Forum's expectation of a very high success rate. This expectation is based in part on the completion of vendor due diligence, industry commitment to address year 2000 concerns, and the maturity of products within the telecommunications network."*⁴

ATIS

ATIS testing checked inter-network interoperability of different local and long-distance service providers' equipment in a Y2K environment. Tests focused on voice call processing events, mass calling events and potential congestion. The tests were also designed to ensure that cross-network services call completion (such as calling card validation and toll-free service) would not be adversely affected. In addition, ATIS tested the Government Emergency Telecommunications Service (GETS) to ensure that the system would function. All tests were conducted on remediated infrastructure from January 1999 to February 1999. No Y2K-related anomalies were reported.

ATIS also collaborated with the financial services community to test key financial network services. Testing was designed and executed to verify the functioning of interconnected data communications services (frame relay networks) in a Y2K environment. Tests focused on network services that support financial industry transaction processing such as credit card authorization and the

clearing and settlement process. Testing was conducted on remediated infrastructure in April 1999 and, again, no Y2K-related anomalies were encountered.

FCC and NRIC

The Federal Communications Commission (FCC) contributed greatly to the understanding of Y2K's impact when it rechartered the Network Reliability and Interoperability Council (NRIC). In July 1998, the FCC appointed C. Michael Armstrong, CEO of AT&T, to spearhead this massive effort. The rechartering of NRIC, which had been suggested by Senator Jon Kyl in March 1998, allowed coordination of government and industry efforts. NRIC moved quickly to capitalize on existing collaborative efforts in the industry.

NRIC was chartered to ensure that the PSTN maintained "*optimal reliability, interconnectivity and interoperability*" during the Y2K transition.⁵ NRIC has focused on assessing and evaluating the magnitude of Y2K risks to the PSTN, as well as on the testing and contingency planning efforts of government and industry. Where appropriate, NRIC has made recommendations to carriers, network end users, the FCC, and others.

After extensive testing and research, NRIC believes the effects of Y2K on the PSTN are likely to be minimal. The ability to initiate and complete voice and data transactions is not expected to be affected by Y2K. However, NRIC notes that "*unpredictable infrastructure failures,*

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changes in consumer behavior, or CPE/ private networks could adversely impact telecommunications. Full interoperability between compliant and noncompliant elements is unknown.”⁶

Domestically, major carriers are estimated to be 98% complete with remediation and implementation. The industry plans to be 100% ready with remediation and implementation by September 1999. Unfortunately, little is known about the readiness of small- and medium-sized carriers. Numerous efforts are underway to assess the readiness of the more than 1,300 carriers in this subsection. In a survey of 500 small telcos the National Telephone Cooperative Association found that by the end of July, 92 percent of the responding rural telephone systems expected to be Y2K compliant in switching, 94 percent in transmission, 80 percent in billing, and 90 percent in network support.⁷ All expect to be 100% compliant in December. The FCC, U.S. Telephone Association (USTA), and the National Association of Regulatory Utilities Commissioners (NARUC) are all trying to update readiness information. While the number of small- and medium-sized carriers is large, they make up only about 2% of U.S. access lines.

In the first quarter of 1999, telecommunications conversions were projected to be implemented by July 1999. According to NRIC, most U.S. carriers now report that they expect to complete remediation by September. Small- and medium-sized carriers continue to claim that they will complete conversions through the

fourth quarter of 1999. However, comprehensive information is still not available on small carrier readiness. The FCC expects to release information on this sector of wireline services in October.

Major telecommunications carriers estimate they will spend more than \$2.8 billion to upgrade networks and supporting systems. The scope of Y2K corrections taken on by key U.S. long distance and international carriers is of unprecedented proportions. Carriers have had to address network infrastructure, such as switches, routers, and hubs, in addition to understanding the risks presented by Y2K challenges in electric power. The 10-Q filings of major carriers provide insight into the scope of corrections. AT&T's 10-Q filing notes that the firm has approximately 3,000 internally developed software applications that include about 380 million lines of code.⁸ MCI WorldCom--with more than 250 million lines of code, more than 1,000 application systems, and nearly 700 network systems across the enterprise--must ensure that Y2K will not disrupt mission-critical systems.⁹ Despite these massive challenges, carriers are on track to complete renovations.

In March 1999, the FCC expressed cautious concern about the wireless industry because of the disappointingly low response--31%--to its industry survey. While the response rate was low, the respondents collectively serve about 39% of the nation's 108.3 million wireless subscribers.¹⁰ What was disturbing was that, as of March, “Only about half

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of the operators serving less than a half-million customers have implemented a remedial plan or process, while large operators have completed almost 60 percent of their fixes.”¹¹

Despite the lack of information available in March, the wireless industry was hard at work to ensure the industry would be ready. The Cellular Telecommunications Industry Association, major cellular carriers, and equipment suppliers participated with ATIS network testing, which addressed wireless to wireline testing; wireline to wireless testing; wireless to wireless testing; GETS; and emergency 911 calling.

Of more than 825 tests executed, there were 75 test anomalies. No Y2K-related anomalies were reported. All anomalies encountered were addressed, re-tested, and the test event was subsequently successfully completed. Concern about the readiness of small cellular service providers and the state of contingency planning in the cellular community remain.

Interdependencies

In an effort to ensure that critical interdependencies would not be compromised by unexpected Y2K-related problems, AT&T, Bell Atlantic, and the North American Electric Reliability Council (NERC) agreed to collaborate on tests between May and July of 1999.¹² During the tests, electric utility participants conducted simultaneous tests of their equipment. The intent was to demonstrate that critical data services and equip-

ment will remain available throughout the date change to the Year 2000.

After selecting the most relevant and critical business applications, NERC and its participating Regional Council members selected the services and tests most relevant and critical to the continuation of their business functions. Participants allowed 15 minutes for the systems to stabilize before they went through the Y2K transition. The systems were then observed for an additional 15 minutes to ensure that they completed the transition successfully. For a total observation time of 30 minutes, the carriers demonstrated service continuity and quality over all of the date-time transitions, while NERC participants performed typical actions required to ensure their end systems operated correctly.

Because this test was a demonstration of previously certified network elements, no extraordinary situations were simulated, such as loss of signal, loss of power, or other unexpected events. The participants concluded that, for the tested systems and dates, the AT&T and Bell Atlantic communication equipment and the electric utility monitoring and control systems will interoperate correctly in the Year 2000.¹³

International

The ITU, which has been coordinating interoperability and testing activities between major international carriers, is engaged in an effort to ensure that all international gateway switch types are tested through

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bilateral agreements between participating network operators. Minimum test requirements cover International Direct Dialed voice call set-up, processing, and termination over the course of critical rollover dates.

There are 19 uniquely configured switches sold by seven manufacturers used as international gateway switches. The ITU has expressed concern about the ability to test all of the switch types. ITU's minimum testing is limited and applies to voice call processing only. Other network services or conditions may be tested at the discretion of the parties. Unfortunately, there will be no assurance of uniform testing of a full range of services during all bilateral testing efforts. Test results are not readily available and only limited results are publicly available.¹⁴

International testing is continuing, and reported international testing results to date are encouraging. The ITU is reporting that, as of July 1999, testing was successfully completed on eight International Gateway Switches available from six vendors.

Although detailed test results are unavailable to the public from the ITU, some carriers are posting reports. For example, AT&T posted five reports of successful international testing of voice and frame relay data services with Hong Kong Telecom, Telkom South Africa, and Singapore Telecom.

Contingency Planning

Extensive interoperability testing has bolstered confidence in the PSTN's ability to operate properly and accurately exchange information in the Year 2000. However, inherent complexities and network interdependencies preclude the industry's ability to perform 100% testing. It is not possible to fully recreate the operational public network in an "off-line" lab environment for testing purposes. Year 2000 interoperability can only be tested in pieces within a lab environment, and can be fully assured compliant only if all pieces interoperate on January 1, 2000, and throughout the next year. The recent MCI WorldCom outage illustrates that even comprehensive and rigorous lab testing can miss service-impacting glitches when it is installed in a "live" environment. The network instability created by the MCI WorldCom upgrade lasted for approximately 10 days, frustrating both the carrier and its customers.

From the beginning, the Committee has stressed the need for Y2K contingency planning. The FCC also emphasized that, "*there is no assurance against random Year 2000 disruptions, despite the thorough and deliberate remediation efforts any entity may undertake. It is simply not possible to foresee all points of disruption from Year 2000 problems.*"¹⁵ The FCC also cautioned that, "*Year 2000 disruptions may come from more than a single point-of-failure.*"¹⁶

The Office of Science and Technology Policy (OSTP) plays a key role in the reconstitution of communications and maintains a Joint Telecommunications Resources Board

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(JTRB) to assist in crisis situations. The JTRB supports the director of the OSTP, and is convened to consider the need for federal government action in response to a crisis or emergency situation impacting telecommunications. JTRB members are supposed to monitor potential or actual telecommunications emergency situations that may pose a significant threat to telecommunications facilities or national security and emergency preparedness (NS/EP) services, and situations that may create the need for extraordinary telecommunications support. The JTRB has been given the task of helping resolve competing demands for telecommunications services, telecommunications policy issues, and necessary service reprioritizations resulting from non-wartime emergency situations.

The JTRB's standard operating procedure shows that its role includes responding to numerous types of emergency situations, some of which could occur if there were severe unexpected Y2K-related events:

- Telecommunications damage or congestion caused by major disasters (e.g., hurricanes, tornadoes, floods, and earthquakes) or critical situations (e.g., fires, explosions, civil disturbances, escaping lethal gases, power blackouts);
- Major failures or disruptions of overseas transmission systems (ocean cables satellites, earth stations) or the interruption or drastic reduction in telecommunication services to foreign countries beset by major disasters, emergencies, or internal problems;
- National or regional situations characterized by unusual events that create public concern or confusion to the extent that abnormal telecommunications traffic patterns or congestion occur for an extended period;
- Extreme catastrophic technological, natural, or other domestic emergencies of national significance;
- Significant curtailments in service on government telecommunication networks or facilities due to technical or operational problems, traffic situations, etc.;
- Known, suspected, or attempted sabotage of major telecommunication installations or facilities, or major industry work stoppages with the potential to significantly affect telecommunication operations; and
- Known, suspected, or threat of nuclear, biological, or chemical terrorist activity that could potentially affect telecommunications operations, facilities, and service providers.

After receiving a letter from the Committee Chairman, the JTRB met for the first time during the Clinton Administration in January 1999 to discuss the role it might play in a Y2K event. Y2K technological problems and potential disruptions all fall well within the normal scope of

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JTRB responsibilities. The JTRB decided to wait and see what developed with the President's Y2K Council and the Information Coordination Center (ICC). In spring 1999, the Committee began asking how the JTRB would be integrated into the ICC effort. No one could answer any specific questions at that time.

On August 5, the JTRB met again to discuss what resources it had at its disposal and how it would function operationally in a Y2K event. One question was how JTRB members would communicate with one another in the event of crisis. The JTRB and OSTP have operational responsibilities, but it is disturbing that they are uncertain how they will perform them during a crisis. Clearly, if some catastrophic telecommunications outage were to occur tomorrow, JTRB members and the OSTP could be struggling to communicate.

The NS/EP plans that exist for communications have worked well in the past but they may not be adequate in the future. The key links in the understanding of how they work seem to have atrophied. This is an area with implications far beyond Y2K that must be addressed. The JTRB is expected to meet twice more before the end of the year to finish Y2K plans. Recently, the Critical Infrastructure Assurance Office has accepted the challenge of understanding the JTRB mission and ensuring that it is properly integrated into the ICC effort.

Another serious concern, highlighted by the Y2K experience, is the Administration's failure to report to

Congress on the future of the NCS and its modernization to deal with 21st century threats such as increasing interconnectivity and information warfare. The NCS maintains a trusted government partnership with industry and can help coordinate reconstitution in a way the FCC cannot because of its regulatory status. The NCS was assigned responsibilities for national security and emergency preparedness telecommunications by Executive Order No. 12472.

Cross-industry plans are taking shape, nationally and internationally. For example, cooperative industry/government information exchanges are being planned and implemented through the NCS in the U.S. During the first six hours of the Year 2000, most types of network elements in the global information infrastructure will go through the Y2K rollover. As the Y2K challenge moves from New Zealand to Thailand, a signal will go to carriers around the globe about the potential for problems. Carriers have organized a "follow-the-sun" strategy, which enables them to collect information on anomalies or unusual occurrences.

In June, the National Security Telecommunications Advisory Committee (NSTAC) reported to the President, *"It is prudent to establish an international Y2K early warning system for telecommunications recognizing that the 17-hour advance notice will afford the United States a very short time frame in which to initiate response or remediation efforts."*¹⁷ NSTAC also noted that *"disruptions and outages attributable to Y2K*

could occur well before or after the actual date change.”¹⁸ The NSTAC endorsed the NCS's proposed domestic and international role as a national coordinating body in preparing for and responding to Y2K telecommunications events, including NCS involvement in a Y2K early warning system.

The NSTAC also observed, “Y2K may provide an example of a cyber-related incident of global scope. Y2K can serve as a test case and provide lessons learned for additional preparations required to protect the Nation's critical infrastructures.”¹⁹ Y2K has prompted industry to try to augment NCS's capabilities so that if unexpected network problems do occur a coordinated response will be possible.

Limited information is available on the status of contingency planning. The FCC has reported that wireline and wireless carriers have been vague about when Y2K contingency plans will be complete. The FCC's concerns are echoed by an analysis of 10-Q and 10-K public disclosures; of nine filings reviewed, five did not give completion dates for contingency plans. Many carriers are updating existing plans to reflect Y2K-related contingencies. The Telco Year 2000 Forum is addressing the contingency planning issue with its members through information exchange.

NRIC has actively encouraged contingency planning by co-sponsoring workshops with USTA and by furnishing detailed information on how users and carriers can perform con-

tingency planning, at its Web site, <http://www.nric.org>.

NSTAC collaborated with the NCS in the development of contingency plans to prepare for Y2K and improve intercarrier coordination for potential widespread outage recovery. These efforts include enhancement of the National Telecommunications Coordinating Network (NTCN), a Y2K compliant, multipath communications network supporting coordination among federal government and telecommunications industry centers during times of degraded PSTN operation.

The NCS also is taking the appropriate steps to link the NTCN, via the NCS conference bridge, with the Alerting and Coordinating Network, a nationwide network of private lines that is separate from the PSTN and which connects major telecommunications providers, vendors, and suppliers. In addition, the NSTAC Y2K working group has been working with the NCS to establish a tracking mechanism to monitor domestic Y2K outages. This mechanism is being considered for international application.

Internet

The large number of players in the Internet landscape makes problems a real possibility. As the Committee researched Y2K's effect on the Internet, it found that the protocols powering the Internet will not be impacted by Y2K. However, more and more concerns began to surface about the readiness of Internet Service Providers (ISPs). The

NRIC interoperability testing subcommittee identified a gap in ISP interoperability testing and status of readiness, but it was beyond NRIC's scope to do an actual assessment. In June 1999, members of the NSTAC expressed concern about the Y2K readiness of the Internet to the Chairman of the President's Y2K Council. In July, the Council convened a roundtable to discuss Y2K implications on Internet readiness.

Network Solutions, Inc. operates two of the world's 13 root servers and is responsible for the assignment of domain names like ".com" and ".org." The firm's SEC filing demonstrates the complicated and interdependent Internet world:

"...our business depends on the continued operation of, and widespread access to, the Internet. This, in turn, depends to a large extent on the software and systems of third parties on which our systems rely or to which they are connected. These third parties include, among others, Internet-related companies, including Internet web hosting companies, Internet access providers and Internet domain name server operators.

*We have no responsibility for, nor control over, other Internet domain name server operators that are critical to the efficient operation of the Internet. We do not know whether such domain name server operators have hardware, software or firmware that is Year 2000 compliant.*²⁰

Internet reliability is being left to the due diligence of ISPs and providers. It is generally believed that business

pressure will keep this unregulated sector online.

STATUS

Domestic

As of March 1999, more than 90% of the U.S. PSTN and its supporting systems were reported Y2K compliant. By the end of June, estimates placed overall implementation above 98%. The industry set September as the current target for carriers to be 100% converted and implemented.

Large carriers report progress consistent with completion of all compliance activity in the third quarter of 1999. Y2K fixes on network switches were about 99% completed in June 1999.

The readiness of small- and medium-sized LECs remains elusive. April indicators projected that these carriers would be Y2K ready by the third and fourth quarter of 1999.

The FCC is trying to confirm that small- and medium-sized carriers are still on track. Meanwhile, other organizations, such as USTA and NARUC, are polling their memberships. NRIC plans on releasing a more detailed accounting of this sector in October 1999.

International

In their assessments of international readiness to date, experts caution that disruptions could occur but the impact will likely be limited in both scope and effect. Most believe

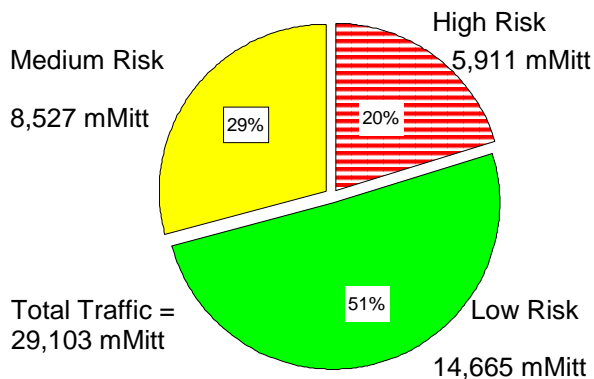
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that failures will include call setup delay due to congestion in some foreign networks, as well as service quality degradation over time due to non-compliant network components.

There is uneven information available about the Y2K readiness of telecommunications carriers outside the U.S. According to the ITU's testimony before the Committee in July 1999, material disruption to network call connectivity is unlikely; there is little date-sensitive information passed across network interfaces in real time. However, there may be difficulties in connecting to some

NRIC developed an assessment of international Y2K readiness of communications in 219 countries. NRIC also identified countries "perceived" to have a high risk of failure. In analyzing traffic to and from the U.S. that exceeded 100 million minutes, NRIC identified 53 key countries. In July, 49% of these key countries were considered to be in medium- to high-risk categories for failures (see Figure 1). These numbers show a significant improvement from April 1999 when NRIC placed 82% of the world's countries in the medium- to high-risk category.

Figure 1: International Risk



Source: NRIC

telecommunications providers, and there may be unexpected effects due to re-routing of network traffic. The ITU believes major telecommunications companies and their partners are unlikely to experience significant Y2K-related service disruption.

Because of limited time and resources, NRIC employed six sources of global risk data furnished on an anonymous reporting basis. It should be noted that NRIC has developed the best assessment of international telecommunications that exists. Unfortunately, the information gained was collected in different formats. NRIC recognized data limitations; information is inconsistent from report-to-report and country-to-country. NRIC provides a caveat for the analysis of the data by noting that there is often a large variability in the risk perception of a given country. In addition, NRIC found that the absence of commonly-defined terms and the tendency of some countries to conservatively project Y2K completions in late 1999 added to the challenge of analyzing the data.

According to NRIC, the international impacts of Y2K could result in network congestion and cause minor delays or rerouting. In addition, network management, provisioning,

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and capacity could be challenged by Y2K-related problems. Networks with non-compliant elements may experience problems locally. The good news is that fully remediated networks are not projected to experience problems.

Overall NRIC findings indicate that:

- risk of call failure between North America and other regions is low;
- potential impacts include call setup delay due to congestion in some foreign networks, and service quality degradation over time due to non-compliant network components; and
- unpredictable infrastructure failures (e.g., power) could have adverse impacts on networks.

One of the most difficult areas to understand is the risk of failure for medium- and high-risk countries. NRIC identified its risk levels based on the perception of risk. Unfortunately, it is not easy to clearly define perceptions of risk and create a baseline understanding of possible Y2K-related failures or likelihood of such occurrences. For example, a risk of failure could include disruptions in voice, data, or business systems. But are the perceptions of failures those that would impact government, business, and the individual users, or would they be absorbed by an individual carrier's network managers? It is also difficult understand what threshold was used to determine the assignment of labels such as a "high

risk of failure" or a "low risk of failure."

The key high-risk regions identified by NRIC include Central and South America (including Mexico); the Indian sub-continent; Sub-Saharan Africa; Eastern Europe; the Middle East and North Africa (excluding Israel); and the Asia-Pacific region.

NRIC also identified 18 countries whose low score (and high risk) was inconsistent with other publicly available data such as their rank in the Top 50 in gross domestic product. This raised concerns about whether public statements reflect reality. The countries include China, Brazil, Russia, Turkey, India, Norway, Poland, Iran, Saudi Arabia, Greece, Israel, Chile, Columbia, Pakistan, Syria, the Czech Republic, Ukraine, and Hungary.

EXPECTATIONS

Based on the Committee's research over the past year, as well as the remarkable efforts of the communications industry, the stability of the U.S. telecommunications industry looks very good. Domestically, call processing, including the ability to initiate and complete voice and data calls, is not expected to be adversely impacted by Y2K. Extensive efforts taken in the U.S. to remediate and test network infrastructure minimize the likelihood of widespread service outages. Test results support the conclusion that remediated infrastructure will encounter few, if any, Y2K-related disruptions. There may be problems with the "last mile."

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For example, small- and medium-sized providers who are thought to be lagging behind in Y2K fixes, which could deny service to some rural areas.

CONCERNS

- If left unremediated, Y2K poses a range of risks to telecommunications services globally. Basic call processing may be unaffected immediately but there could be other problems, including:
 - limited or blocked service due to degraded network operations;
 - problems with service billing;
 - problems with network maintenance capabilities;
 - problems with network operator interfaces, such as incorrect date or day-of-week displays; and
 - features available on some customer premises equipment, such as date-related call-routing, may fail.
 - Legal impediments may challenge international call delivery. Many countries prevent international carriers from working around the host country's network via satellite or other means. If a country experiences a serious Y2K-related disruption in communications, these legal impediments may prevent international carriers from delivering calls.
- There has been no attempt to assess whether the rush to implement Y2K fixes on a global scale will have a lingering impact on the stability of global communications over the next year.
 - Unpredictable infrastructure failures, changes in consumer behavior, or CPE/private network problems could adversely impact telecommunications.
 - Full interoperability between compliant and non-compliant elements and their impact on the PSTN remains unknown.
 - The impact of network congestion caused by increased call volume and ad hoc "testing" could be problematic.
 - Unexpected thresholds might be encountered in lab tested software and cause network stability problems.
 - The lagging Y2K readiness of small- and medium-sized domestic carriers could adversely impact services in rural communities.
 - Limited information is available on the status of international telecommunications carrier efforts, and test results does not build confidence.

¹ Sprint Y2K Page, <http://www.sprint.com>.

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- ² FNRC Year 2000 Interoperability Testing with AT&T: Detailed Final Report, June 1999.
- ³ Network Interoperability Testing for the Year 2000: Final Report. Telco 2000 Forum February 1999, p. 8 (www.telecoyear2000.org).
- ⁴ Ibid. at p. 10.
- ⁵ NRIC Charter (www.nric.org).
- ⁶ NRIC presentation, Aug. 5, 1998.
- ⁷ http://www.ntca.org/press/releases/pr_071399.html
- ⁸ AT&T SEC 10-Q filing, Aug. 13, 1999, at <http://www.sec.gov/>.
- ⁹ MCI WorldCom SEC 10-Q filing, Aug. 18, 1999, at <http://www.sec.gov/>.
- ¹⁰ FCC Report on Telecommunications, March 1999.
- ¹¹ Ibid.
- ¹² The participants in these tests were: AT&T Corporation; Bell Atlantic Corporation; Central Hudson Gas & Electric Corporation; New York Power Authority; PJM Interconnection, L.L.C.; Public Service Enterprise Group; The New York Power Pool; and The North American Electric Reliability Council (NERC).
- ¹³ Year 2000 Interoperability Test Evaluation Report: AT&T / Bell Atlantic / NERC.
- ¹⁴ http://www.itu.int/y2k/ICTWG_public/index.html.
- ¹⁵ The Y2K Communications Sector Report, FCC, Mar. 1999, p. 42 (www.fcc.gov).
- ¹⁶ Ibid.
- ¹⁷ The President's National Security Telecommunications Advisory Committee Operational Subgroup Report, June 1999.
- ¹⁸ Ibid.
- ¹⁹ Ibid.
- ²⁰ Network Solutions, Inc. SEC 10-Q filing Aug. 17, 1999, at <http://www.sec.gov/>.